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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/509,616

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Migaku Takahashi

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EXAMINER

LOUIE, MANDY C

ART UNIT

PAPER NUMBER

1792

NOTIFICATION DATE

DELIVERY MODE

12/04/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ptomail@rkmlegalgroup.com

Office Action Summary	Application No. 10/509,616	Applicant(s) TAKAHASHI ET AL.	
	Examiner MANDY C. LOUIE	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 August 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 and 19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claims 1-9, 19 are objected to because of the following informalities: "in a multilayer" appears to be describing a structure or manner, but does not positively recite that structure or manner. Appropriate correction is required.
2. Claim 6 is objected to because of the following informalities: "andlor" should be changed to "and/or". Appropriate correction is required

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-2, 6 and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Egelhoff [Oxygen as a surfactant in the growth of giant magnetoresistance spin valves].

Regarding claim 1, Egelhoff teaches a method of producing a magnetic recording medium [abstract] comprising a step of forming successively a nonmagnetic substrate, a metal underlayer, and a ferromagnetic metal layer in a multilayer manner wherein said ferromagnetic metal layer contains a plurality of ferromagnetic films (i.e. Co layers) and a nonmagnetic metal space layer (i.e. Cu layer) formed between said ferromagnetic films, the step of forming said ferromagnetic metal layer is a step of forming alternatively a plurality of ferromagnetic films and one or more nonmagnetic metal spacer layer or layers in a multilayer manner [Fig. 1], and comprising a step of allowing at least the interface between said nonmagnetic metal spacer layer or layers and said ferromagnetic films to adsorb physically oxygen and/or nitrogen [pg. 6143, col 2; pg. 6144-6145].

Regarding claim 2, Egelhoff teaches the nonmagnetic metal spacer layer or layers is or are formed in such a way that said oxygen and/or nitrogen may be contained in the film of the nonmagnetic metal spacer layer or layers [pg 6145, col 1].

Regarding claim 6, Egelhoff teaches the step of allowing at least the interface between said nonmagnetic metal spacer layer or layers and said ferromagnetic film to adsorb physically oxygen and or nitrogen is a step of exposing the surface of said nonmagnetic metal spacer layer or layers to an atmosphere containing oxygen and/or nitrogen [pg 6144, col 2].

Regarding claim 8, Egelhoff teaches the metal spacer layer may contain Cu [Fig. 1].

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 9 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Egelhoff.

Regarding claim 9, although Egelhoff does not explicitly teach the thickness of the metal spacer layer is set at the claimed thickness range; Egelhoff does teaches the adjustment of the thickness of the metal spacer layer incorporated with the oxygen may affect the coupling field of the magnetic recording medium (i.e. for the spin valves) [pg 6145]. Hence, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the thickness of the spacer layer as workable parameter in order to adjust the coupling field of the medium at a desirable level.

In regards to claim 19, teaching of Egelhoff is aforementioned; but does not explicitly teach a step of allowing all interfaces between the spacer layer and ferromagnetic films to adsorb oxygen and/or nitrogen. However, it would have been obvious to one of ordinary skill in the art that mere duplication of parts (i.e. adsorbing both sides of the spacer layer; hence all interfaces between the spacer layer and

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ferromagnetic layers are adsorbed of oxygen and/or nitrogen) would not have patentable significance (since the advantages of one interface (i.e. front of the spacer) having adsorption would have same advantage as at other interface (i.e. back of the spacer) unless new and unexpected results is produced.

3. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Egelhoff in view of Maesaka [JP 2002025032].

Teaching of Egelhoff is aforementioned; however, does not explicitly teach wherein the gas used for forming the nonmagnetic metal spacer layer or layers is a mixed gas obtained by mixing oxygen or nitrogen with Ar or other rare gases. Maesaka remedies this.

Regarding claim 3, Maesaka teaches forming a layer incorporated with oxygen for a magnetic recording medium may be deposited on the substrate using a mixed gas obtained by mixing oxygen with Ar or other rare gases [0071].

It would have been obvious to one of ordinary skill in the art at the time of the invention to mix oxygen or nitrogen gas with a diluting gas such as argon as suggested by Maesaka. One would have been motivated to do so in order to use a well known technique (i.e. argon as a diluting gas) to effectively control the oxygen concentration during formation of the layer incorporated with oxygen (wherein Egelhoff suggests it would be desirable to allow continuous flow of oxygen, while also controlling the content of the incorporated oxygen [pg 6145-6146]).

Regarding claims 4 and 5, although Egelhoff in view of Maesaka does not explicitly teach the partial pressure of oxygen or nitrogen in the mixed gas is set at the

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claimed pressure ranges; it would have been obvious to one of ordinary skill in the art in light of the prior art to optimize the partial pressure as a workable parameter in order to obtain a desirable oxygen adsorption or concentration on the targeted surface [Egelhoff, pg 6144-6146].

4. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Egelhoff in view of Shimizu [US 20020127433].

Teaching of Egelhoff is aforementioned; however, does not explicitly teach wherein the gas used for forming the nonmagnetic metal spacer layer or layers is a mixed gas obtained by mixing oxygen or nitrogen with Ar or other rare gases. Shimizu remedies this.

Regarding claim 3, Shimizu teaches a gas for forming a layer incorporated with oxygen for a magnetic recording medium may be deposited on the substrate using a mixed gas obtained by mixing oxygen with Ar or other rare gases [0087].

It would have obvious to one of ordinary skill in the art at the time of the invention to mix oxygen or nitrogen gas with a diluting gas such as argon as suggested by Shimizu. One would have been motivated to do so in order to use an operable equivalent means for (i.e. argon as a diluting gas) easily controlling the oxygen concentration during formation of the layer incorporated with oxygen; thereby promoting stable manufacturing [Shimizu, 0087].

Regarding claims 4 and 5, although Egelhoff in view of Shimizu does not explicitly teach the partial pressure of oxygen or nitrogen in the mixed gas is set at the claimed pressure ranges; it would have been obvious to one of ordinary skill in the art in

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light of the prior art to optimize the partial pressure as a workable parameter in order to obtain a desirable oxygen adsorption or concentration on the targeted surface [Egelhoff, pg 6144-6146].

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Egelhoff in view of Hartsough [US 4420385].

Teaching of Egelhoff is aforementioned; however, does not explicitly teach the exposure of the layer to oxygen is set at 10 Langmuir or more. Hartsough remedies this.

Regarding claim 7, Hartsough teaches oxidation of layer on a magnetic recording medium may be controlled based upon units of Langmuir for exposure, wherein such units may determine the speed at which oxidation is performed [col 6, ln 25-50].

It would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the oxygen exposure of the layer to a specific Langmuir range (i.e. 10 or more) as a workable parameter. One would have been motivated to do so in order to achieve a desirable concentration of oxygen on the surface within a desirable amount of time (i.e. to improve throughput).

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Egelhoff in view of Fukuzawa [US 20020048127].

Teaching of Egelhoff is aforementioned; however, does not explicitly teach the exposure of the layer to oxygen is set at 10 Langmuir or more. Fukuzawa remedies this.

Regarding claim 7, Fukuzawa teaches forming a nano oxide or nitride layer between magnetic and metal layers of a magnetic recording medium [abstract], wherein

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the prior art teaches Langmuir affects the amount of oxygen provided on the targeted surface [0168-0170].

It would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the oxygen or nitrogen exposure of a layer to a specific Langmuir range as a workable parameter. One would have been motivated to do so in order to achieve a stable amount of element concentration on the targeted surface.

Response to Arguments

7. Applicant's arguments filed 08/27/09 have been fully considered but they are not persuasive.

In regards to applicant's argument that it would have been understood that the magnetic recording medium of the present invention is a longitudinal magnetic recording medium on page 5 of remarks; it is noted by the examiner, that such interpretation is not readily understood, since the disclosure teaches broadly "all magnetic recording media" and does not specifically indicate longitudinal media.

In regards to applicant's argument that intent of prior art (i.e. Gill or '032) does not match the intent of the instant invention on pages 6-7 of remarks; it is noted by the examiner that it is not necessary that the prior art suggest the combination to achieve the same advantage or result discovered by applicant. (See MPEP 2144.IV). Moreover, it is relied upon '032 to teach using a mixture of oxygen and/or nitrogen gas with a rare gas such as argon as an operable means for controlling a concentration of the elements to a layer; rather teaching a spacer layer being adsorbed with the desired element.

In regards to applicant's argument that Hartsough does not teach disclosing exposure of oxygen to a Langmuir range, such teaching is provided at col 6, ln 25-50, wherein such teaching is also aforementioned.

8. Applicant's arguments with respect to claims 1-9, 19 have been considered but are moot in view of the new ground(s) of rejection necessitated by Applicant's amendments filed on 08/27/09 (wherein previous interpretation of the claim did not require the spacer layer(s) to be located between ferromagnetic films).

Conclusion

1. No claim is allowed.
2. Claims 1-9, 19 are rejected for the reasons aforementioned.
3. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MANDY C. LOUIE whose telephone number is (571)270-5353. The examiner can normally be reached on Monday to Friday, 7:30AM - 5:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571)272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. C. L./
Examiner, Art Unit 1792

/Timothy H Meeks/
Supervisory Patent Examiner, Art Unit 1792